

Amendments to the Claims

1 Claim 1 (currently amended): In a short-range wireless networking environment, a method of
2 enabling communication between at least one end device and at least one application server,
3 comprising the steps of:

4 providing at least one access point (AP), wherein each of the APs ~~[[has]]~~ is adapted for
5 communicating over at least one short-range wireless connection and at least one network
6 connection;

7 providing at least one extension point (EP), wherein:

8 each of the EPs has ~~at least two~~ a directional antenna and an omnidirectional
9 antenna, each of the antennas adapted for short-range wireless connections; and

10 at least one of the EPs communicates with ~~at least one~~ of the APs, using one of the
11 at least one short-range wireless connections of the AP and the directional antenna of the EP.[:]]
12 and ~~at least one of the EPs communicates also~~ with at least one selected one of the end devices,
13 using the omnidirectional antenna of the EP; and

14 transmitting traffic between a selected one of the application servers and ~~[[a]]~~ the at least
15 one selected one of the end devices, wherein the transmitted traffic flows between the selected
16 application server and the AP using one of the at least one network connections of the AP, between
17 the AP and a selected EP with which the AP is communicating and with which the at least one
18 selected end device is also communicating, and between the selected EP and the at least one
19 selected end device, through a selected one of the APs and at least one of the EPs.

1 Claim 2 (currently amended): The method according to Claim 1, wherein a short-range wireless

2 link established ~~through at least one of the two short-range wireless connections~~ using the
3 omnidirectional antenna uses a protocol known as "Bluetooth".

Claims 3 - 4 (canceled)

1 Claim 5 (currently amended): The method according to Claim [[3]] 1, wherein the directional
2 antenna of at least one of the EPs is used to communicate with another [[EP]] one of the EPs.

Claims 6 - 7 (canceled)

1 Claim 8 (currently amended): The method according to Claim [[6]] 1, wherein the omnidirectional
2 antenna of at least one of the EPs is used to communicate with another [[EP]] one of the EPs.

1 Claim 9 (original): The method according to Claim 1, wherein each EP is powered using a
2 photovoltaic array or photovoltaic module.

1 Claim 10 (original): The method according to Claim 1, wherein each EP comprises an antenna
2 controller, an amplifier, a power supply, and a short-range communication function.

1 Claim 11 (original): The method according to Claim 10, wherein the short-range communication
2 function is a Bluetooth module.

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1 Claim 12 (original): The method according to Claim 1, wherein each EP comprises an antenna
2 controller, an amplifier, a power supply, and a short-range radio frequency communication module.

1 Claim 13 (original): The method according to Claim 12, wherein the short-range radio frequency
2 communication module is a Bluetooth module.

Claim 14 (canceled)

1 Claim 15 (currently amended): The method according to Claim 1, further comprising the step of
2 providing a connection table which maintains a plurality of EP parameter blocks, each of the EP
3 parameter blocks describing a route between one of the APs at a top level of a hierarchical
4 connection structure and a selected one of the EPs, or a different one of the APs, which is
5 communicably coupled to the AP at the top level.

1 Claim 16 (original): The method according to Claim 15, wherein the connection table is provided
2 at a network control server.

1 Claim 17 (currently amended): The method according to Claim 15, further comprising the step of
2 using wherein the EP parameter blocks further [[to]] describe a route between earth or local
3 coordinates of the [[a]] selected EP or the different and a selected AP.

Claim 18 (canceled)

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1 Claim 19 (currently amended): The method according to Claim [[18]] 1, wherein a position of the
2 directional antenna is set to minimize a bit error rate of [[along]] the wireless [[link]] connection.

1 Claim 20 (currently amended): The method according to Claim 19, further comprising the step of
2 dynamically determining the position of the directional antenna, further comprising the steps of:
3 positioning the directional antenna of the at least one EP at a plurality of angles toward
4 [[the]] an omnidirectional antenna of the AP;
5 recording the bit error rate at each of the angles; and
6 selecting that one of the angles which exhibits a minimal value of the bit error rate, while
7 still maintaining the connection, to be the position of the directional antenna.

1 Claim 21 (original): The method according to Claim 20, wherein the plurality of angles are selected
2 by first locating an initial position beyond which communication using the directional antenna is not
3 possible.

1 Claim 22 (currently amended): The method according to Claim [[18]] 1, wherein a power of
2 transmission of the directional antenna is set to a minimum value required to communicate on the
3 wireless [[link]] connection.

1 Claim 23 (currently amended): The method according to Claim 22, further comprising the step of
2 dynamically determining the power of transmission of the directional antenna, further comprising

3 the steps of:

4 establishing a default value for the power of transmission;

5 recording a bit error rate at the default value;

6 successively reducing the power of transmission until connectivity is lost or the bit error rate
7 crosses a threshold; and

8 setting the power of transmission to be a value that results in the bit error rate staying below
9 the threshold while still maintaining the connection.

1 Claim 24 (original): The method according to Claim 23, wherein the threshold is a maximum
2 acceptable value for the bit error rate.

Claims 25 - 32 (canceled)

1 Claim 33 (currently amended): Computer program instructions embodied on one or more
2 computer-readable media, the computer program instructions adapted for enabling communication
3 between at least one end device and at least one application server in a short-range wireless
4 networking environment and comprising:
5 computer program instructions for communicating with at least one access point (AP),
6 wherein each of the APs [[has]] is adapted for communicating over at least one short-range wireless
7 connection and at least one network connection;
8 computer program instructions for communicating with at least one extension point (EP),
9 wherein:

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each of the EPs has ~~at least two~~ a directional antenna and an omnidirectional antenna, each of the antennas adapted for short-range wireless connections; and

at least one of the EPs communicates with ~~at least one of the APs,~~ using one of the at least one short-range wireless connections of the AP and the directional antenna of the EP.[:]]

and ~~also at least one of the EPs communicates with~~ at least one selected one of the end devices, using the omnidirectional antenna of the EP; and

computer program instructions for transmitting traffic between a selected one of the application servers and ~~[[a]] the at least one~~ selected one of the end devices, wherein the transmitted traffic flows ~~through a selected one of the APs and at least one of the EPs; between the selected application server and the AP using one of the at least one network connections of the AP, between the AP and a selected EP with which the AP is communicating and with which the at least one selected end device is also communicating, and between the selected EP and the at least one selected end device.~~

Claim 34 (currently amended): The computer program instructions according to Claim 33, wherein a short-range wireless link established ~~through at least one of the two short-range wireless connections~~ using the omnidirectional antenna uses a protocol known as "Bluetooth".

Claims 35 - 36 (canceled)

Claim 37 (currently amended): The computer program instructions according to Claim ~~[[35]]~~ 33, wherein the directional antenna of at least one of the EPs is used to communicate with another

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3 [[EP]] one of the EPs.

Claims 38 - 39.(canceled)

1 Claim 40 (currently amended): The computer program instructions according to Claim [[38]] 33,
2 wherein the omnidirectional antenna of at least one of the EPs is used to communicate with another
3 [[EP]] one of the EPs.

1 Claim 41 (original): The computer program instructions according to Claim 33, wherein each EP is
2 powered using a photovoltaic array or photovoltaic module.

1 Claim 42 (original): The computer program instructions according to Claim 33, wherein each EP
2 comprises an antenna controller, an amplifier, a power supply, and a short-range communication
3 function.

1 Claim 43 (original): The computer program instructions according to Claim 42, wherein the short-
2 range communication function is a Bluetooth module.

1 Claim 44 (original): The computer program instructions according to Claim 33, wherein each EP
2 comprises an antenna controller, an amplifier, a power supply, and a short-range radio frequency
3 communication module.

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1 Claim 45 (original): The computer program instructions according to Claim 44, wherein the short-
2 range radio frequency communication module is a Bluetooth module.

Claim 46 (canceled)

1 Claim 47 (currently amended): The computer program instructions according to Claim 33, further
2 comprising computer program instructions for providing a connection table which maintains a
3 plurality of EP parameter blocks, each of the EP parameter blocks describing a route between one
4 of the APs at a top level of a hierarchical connection structure and a selected one of the EPs, or a
5 different one of the APs, which is communicably coupled to the AP at the top level.

1 Claim 48 (original): The computer program instructions according to Claim 47, wherein the
2 connection table is provided at a network control server.

1 Claim 49 (currently amended): The computer program instructions according to Claim 47, further
2 comprising computer program instructions for using wherein the EP parameter blocks further [[to]]
3 describe a route between earth or local coordinates of the [[a]] selected EP or the and a selected
4 different AP.

Claim 50 (canceled)

1 Claim 51 (currently amended): The computer program instructions according to Claim [[50]] 33,

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2 wherein a position of the directional antenna is set to minimize a bit error rate of ~~[[along]]~~ the
3 wireless ~~[[link]]~~ connection.

1 Claim 52 (currently amended): The computer program instructions according to Claim 51, further
2 comprising computer program instructions for dynamically determining the position of the
3 directional antenna, further comprising:

4 computer program instructions for positioning the directional antenna of the at least one EP
5 at a plurality of angles toward ~~[[the]]~~ an omnidirectional antenna of the AP;

6 computer program instructions for recording the bit error rate at each of the angles; and

7 computer program instructions for selecting that one of the angles which exhibits a minimal
8 value of the bit error rate, while still maintaining the connection, to be the position of the directional
9 antenna.

1 Claim 53 (original): The computer program instructions according to Claim 52, wherein the
2 plurality of angles are selected by first locating an initial position beyond which communication
3 using the directional antenna is not possible.

1 Claim 54 (currently amended): The computer program instructions according to Claim ~~[[50]]~~ 33,
2 wherein a power of transmission of the directional antenna is set to a minimum value required to
3 communicate on the wireless ~~[[link]]~~ connection.

1 Claim 55 (currently amended): The computer program instructions according to Claim 54, further

2 comprising computer program instructions for dynamically determining the power of transmission
3 of the directional antenna, further comprising:

4 computer program instructions for establishing a default value for the power of
5 transmission;

6 computer program instructions for recording a bit error rate at the default value;

7 computer program instructions for successively reducing the power of transmission until the
8 bit error rate crosses a threshold; and

9 computer program instructions for setting the power of transmission to be a value that
10 results in the bit error rate staying below the threshold while still maintaining the connection.

1 Claim 56 (original): The computer program instructions according to Claim 55, wherein the
2 threshold is a maximum acceptable value for the bit error rate.

Claims 57 - 63 (canceled)

1 Claim 64 (currently amended): A system for enabling communication between at least one end
2 device and at least one application server in a short-range wireless networking environment,
3 comprising:

4 at least one access point (AP), wherein each of the APs [[has]] is adapted for
5 communicating over at least one short-range wireless connection and at least one network
6 connection;

7 at least one extension point (EP), wherein each of the EPs has at least two a directional

8 antenna and an omnidirectional antenna, each of the antennas adapted for short-range wireless
9 connections;

10 means for establishing communication between at least one of the EPs and ~~at least one of~~
11 the APs, using one of the at least one short-range wireless connections of the AP and the directional
12 antenna of the EP,[[;]] and also with

13 ~~means for establishing communication between at least one of the EPs and at least one~~
14 selected one of the end devices, using the omnidirectional antenna of the EP; and

15 means for transmitting traffic between a selected one of the application servers and ~~[[a]] the~~
16 at least one selected one of the end devices, wherein the transmitted traffic flows through a selected
17 one of the APs and at least one of the EPs, between the selected application server and the AP
18 using one of the at least one network connections of the AP, between the AP and a selected EP
19 with which the AP is communicating and with which the at least one selected end device is also
20 communicating, and between the selected EP and the at least one selected end device.

1 Claim 65 (currently amended): The system according to Claim 64, wherein:

2 a short-range wireless link established through ~~at least one of the two short-range wireless~~
3 connections using the omnidirectional antenna uses a protocol known as "Bluetooth"[[;]]

4 ~~one of the at least two short-range wireless connections uses a directional antenna; and~~

5 ~~one of the at least two short-range wireless connections uses an omnidirectional antenna.~~

Claim 66 (canceled)

1 Claim 67 (currently amended): The system according to Claim ~~[[65]]~~ 64, wherein the
2 omnidirectional antenna of at least one of the EPs is used to communicate with ~~one or more of: (1)~~
3 ~~a selected one of the end devices and (2) another~~ ~~[[EP]]~~ one of the EPs.

1 Claim 68 (original): The system according to Claim 64, wherein each EP comprises an antenna
2 controller, an amplifier, a power supply, and a short-range communication function.

1 Claim 69 (original): The system according to Claim 68, wherein the short-range communication
2 function is a Bluetooth module.

Claim 70 (canceled)

1 Claim 71 (currently amended): The system according to Claim 64, further comprising means for
2 providing a connection table which maintains a plurality of EP parameter blocks, each of the EP
3 parameter blocks describing a route between one of the APs at a top level of a hierarchical
4 connection structure and a selected one of the EPs, or a different one of the APs, which is
5 communicably coupled to the AP at the top level.

1 Claim 72 (original): The system according to Claim 71, wherein the connection table is provided at
2 a network control server.

1 Claim 73 (currently amended): The system according to Claim 71, ~~further comprising means for~~

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2 using wherein the EP parameter blocks ~~[[to]] further describe a route between earth or local~~
3 coordinates of the [[a]] selected EP or the different and a selected AP.

Claim 74 (canceled)

1 Claim 75 (currently amended): The system according to Claim ~~[[74]]~~ 64, wherein a position of the
2 directional antenna is set to minimize a bit error rate ~~[[along]]~~ of the wireless [[link]] connection.
3 and further comprising means for dynamically determining the position of the directional antenna,
4 further comprising:

5 means for positioning the directional antenna of the at least one EP at a plurality of angles
6 toward ~~[[the]]~~ an omnidirectional antenna of the AP;

7 means for recording the bit error rate at each of the angles; and

8 means for selecting that one of the angles which exhibits a minimal value of the bit error
9 rate, while still maintaining the connection, to be the position of the directional antenna.

1 Claim 76 (currently amended): The system according to Claim 75, wherein:

2 the plurality of angles are selected by first locating an initial position beyond which
3 communication using the directional antenna is not possible; and

4 a power of transmission of the directional antenna is set to a minimum value required to
5 communicate on the wireless ~~[[link]]~~ connection; and

6 further comprising means for dynamically determining the power of transmission of the
7 directional antenna, further comprising:

8 means for establishing a default value for the power of transmission;
9 means for recording a bit error rate at the default value;
10 means for successively reducing the power of transmission until the bit error rate
11 crosses a threshold; and
12 means for setting the power of transmission to be a value that results in the bit error
13 rate staying below the threshold while still maintaining the connection.

Claims 77 - 81 (canceled)

1 Claim 82 (currently amended): An extension point (EP) device for enabling communication
2 between at least one of a plurality of end devices and at least one application server in a short-range
3 wireless networking environment, comprising:

4 ~~means for establishing at least two short-range wireless connections from the EP;~~
5 means for communicating, from the EP, with ~~at least one~~ an access point (AP), wherein
6 ~~each of the APs has~~ the AP is adapted for communicating over at least one short-range wireless
7 connection and at least one network connection, wherein the means for communicating uses one of
8 the at least one short-range wireless connections of the AP and a directional antenna of the EP;
9 means for communicating, from the EP, with at least one selected one of the end devices,
10 using an omnidirectional antenna of the EP; and
11 means for transmitting traffic between the application server and the at least one selected
12 one of the end device devices, wherein the transmitted traffic flows ~~through a selected one of the~~
13 ~~APs and the EP. between the application server and the AP using one of the at least one network~~

14 connections of the AP, between the AP and the EP, and between the EP and the at least one
15 selected end device.

1 Claim 83 (currently amended): The device according to Claim 82, wherein:

2 a short-range wireless link established ~~through at least one of the two short-range wireless~~
3 ~~connections using the omnidirectional antenna~~ uses a protocol known as "Bluetooth"[[;]]
4 ~~one of the at least two short-range wireless connections uses a directional antenna, and~~
5 ~~one of the at least two short-range wireless connections uses an omnidirectional antenna.~~

Claim 84 (canceled)

1 Claim 85 (currently amended): The device according to Claim 83, wherein the omnidirectional
2 antenna is used to communicate with ~~one or more of: (1) a selected one of the end devices and (2)~~
3 ~~another EP.~~

1 Claim 86 (original): The device according to Claim 82, wherein each EP comprises an antenna
2 controller, an amplifier, a power supply, and a short-range communication function.

1 Claim 87 (original): The device according to Claim 86, wherein the short-range communication
2 function is a Bluetooth module.

Claims 88 - 89 (canceled)

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1 Claim 90 (currently amended): The device according to Claim ~~[[89]]~~ 82, wherein a position of the
2 directional antenna is set to minimize a bit error rate ~~[[along]]~~ of the wireless ~~[[link]]~~ connection,
3 and further comprising means for dynamically determining the position of the directional antenna,
4 further comprising:

5 means for positioning the directional antenna at a plurality of angles toward ~~[[the]]~~ an
6 omnidirectional antenna of the AP;

7 means for recording the bit error rate at each of the angles; and

8 means for selecting that one of the angles which exhibits a minimal value of the bit error
9 rate, while still maintaining the connection, to be the position of the directional antenna.

1 Claim 91 (currently amended): The device according to Claim 90, wherein:

2 the plurality of angles are selected by first locating an initial position beyond which
3 communication using the directional antenna is not possible; and

4 a power of transmission of the directional antenna is set to a minimum value required to
5 communicate on the wireless ~~[[link]]~~ connection; and

6 further comprising means for dynamically determining the power of transmission of the
7 directional antenna, further comprising:

8 means for establishing a default value for the power of transmission;

9 means for recording a bit error rate at the default value;

10 means for successively reducing the power of transmission until the bit error rate
11 crosses a threshold; and

- 12 means for setting the power of transmission to be a value that results in the bit error
- 13 rate staying below the threshold while still maintaining the connection.